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A REVIEW PAPER ON TWO-WHEELER SPROCKET HUB

K. Anoosha[1], Ch. Jeevan Kumar[2], Ch. Charan[3], K. Vijay Kumar[4], P. Ameer Khan[5], T.W.Aaron[6],
[1]Assistant Professor, Department of Mechanical Engineering, GNIT, Hyderabad, Telangana.
[2] Assistant Professor, Department of Mechanical Engineering, GNITC, Hyderabad, Telangana.
[3,4,5,6]UG Scholars Department of Mechanical Engineering, GNIT, Hyderabad, Telangana.

ABSTRACT
A two-wheeler sprocket hub is a crucial component in the drivetrain of motorcycles and scooters. It integrates two key functions: the hub, which provides a central mounting point for the wheel and bearings, and the sprocket, a toothed gear that interacts with the chain to transmit power from the engine to the rear wheel. This vital part is typically manufactured from robust materials like steel or aluminium to withstand the forces exerted during riding. Replacement sprocket hubs are available for various two-wheeler models, and their selection often depends on factors like the number of teeth on the sprocket and compatibility with the specific motorcycle or scooter.

Keywords:
Two-wheeler, Sprocket hub, Drivetrain, Motorcycle, Scooter, Hub, Wheel, Bearings.

LITERATURE SURVEY

Fred Hansen [1]: a mechanical designer, working at a CAD station in one geographic location, communicates with a CAM facility in another geographic location to obtain a fabricated part with rapid turnaround. Simple mechanical components such as flat plates with holes in them have been designed and manufactured in this way. To rapidly fixture and measure components, new techniques have been developed that drive a touch trigger probe around the component and its holding clamps. At present, this implementation is in 21/2-D. In the future, components will exhibit greater complexity and include 3-D parts with features on all sides and curved surfaces.

KUMAR.A [2]: : Reverse engineering plays vital role in the branch of the mechanical design and manufacturing based industry. This technique has been widely recognized as an important technique in the product design cycle. In regular computerized manufacturing environment, the operation order usually starts from the product design and ends with machine operation to convert raw material into final product. It is often essential to reproduce a CAD model of existing part using any digitization techniques, when original drawings or documentation are not available

Madan Mohan Joshi [3]: The application of Reverse Engineering (RE) is the need of various segments of industries when advanced or mathematical models of existing products are inaccessible. Replicating an existing product by reverse engineering and capturing all information and data to generate a detailed product knowledge bank for engineering design. RE is refined in different stages, scanning, part digitization and 3d modeling (CAD). This current paper introduces the RE process, portrays the recent trends in digitization field and furthermore interfaces with other manufacturing processes

Lima et al [4]: Performed thorough research on se curing and monitoring mobile device assets by discussing the mobile devices' security consequences and discussing the survey on the frameworks, innovations, and use cases for mobile device security management. their research focused on studying the solutions of the management of the mobile devices, considering the preventive methods and techniques related to monitoring and mitigating threats at different nodes in the system. e purpose of this survey was to analyze the available security technologies that can be implemented to maximize the overall security of private data and applications stored and used by businesses and on Android devices.

Ramandeep Singh [5]: Reverse Engineering is focused on the challenging task of understanding legacy program code without having suitable documentation. Using a transformational forward engineering perspective, the much of difficulty is caused by design decisions made during system development. Such decisions "hide" the program

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functionality and performance requirements in the final system by applying repeated refinements through layers of abstraction, and information-spreading optimizations, both of which change representations and force single program entities to serve multiple purposes. The demand by all business sectors to adapt their information systems to the web has created a tremendous need for methods, tools, and infrastructures to evolve and exploit existing applications efficiently and cost-effectively. Reverse engineering has become the most promising technologies to combat this legacy systems problem. Following the transformational approach we can use the transformations of a forward engineering methodology and apply them "backwards" to reverse engineer code to a more abstract specification. This paper presents reverse engineering program comprehension theories and the reverse engineering technology.

Chaitanya Thakur [5]: An overview of Reverse Engineering is that it is the procedure in which a given object is thoroughly examined, just to procure an abridged knowledge of its origination and functionality. This information usually contains structure charts, data description and PDL to describe processing details. Various steps within reverse engineering are followed to procure this knowledge. The reverse engineering starts with an executable program. The tools that Reverse Engineering procedure uses are dissembler and compilers, and some other tools are also used as per the need. In past, reverse engineering was drawn parallel with the shady and illegitimate uses in context to software piracy. But today, reverse engineering is applied for lots of legitimate applications. In this paper, a detailed view of the Reverse Engineering, Tools and techniques, Uses, and some History of Reverse Engineering is given.

Aaron D. Little [6]: At a basic level, product design composes three primary tasks: specification development, conceptual and configuration design, and product refinement. Customer needs analysis, product benchmarking, and business case analysis are fundamental to specification development, whereas conceptual design and product refinement entail functional analysis, the generation of solution principles and product geometry, concept selection, mathematical modelling, prototyping, and Taguchi analysis for variability. In this paper, we focus on an advanced method for functional analysis, a critical component of this process. This method demonstrates clear ties to customer needs, and is based on an empirical study of approximately 60 household consumer products. As part of this study, a common vocabulary for product functions and flows is developed and applied to the consumer products. House of Quality results are then used to correlate customer importance to the product functions. Data from these correlations provide a basis for determining critical functions and flows across all products and within important product domains, such as material processors and beverage brewers. From this study, we discuss how the results can be applied to product testing and benchmarking, design by analogy, the identification of functional groups and dependencies, and design education.

Danielle Babb [7]: Reverse engineering, which sometimes can be referred to as back engineering, is the process through which aircraft, software, machines, and architectural structures, among other different products, are decomposed to get design information. In most cases, the process of reverse engineering surrounds the deconstruction of individual constituents of more significant merchandise. This paper introduces the reader to popular concepts, uses, stages and future of reverse Engineering. It shows how Reverse Engineering is continually evolving and shaping the concept of Cyber Security

Kwan H. Lee [8]: The design models of a new product in general are created using clay models or wooden mock-ups. The reverse engineering (RE) technology enables us to quickly create the CAD model of the new product by capturing the surface of the model using laser digitizers or coordinate measuring machines. Rapid prototyping (RP) is another technology that can reduce the product development time by fabricating the physical prototype of a part using a layered manufacturing technique. In reverse engineering process, however, the digitizer generates an enormous amount of point data, and it is time consuming and also inefficient to create surfaces out of these data. In addition, the surfacing operation takes a great deal of time and skill and becomes a bottleneck. In rapid prototyping, a faceted model called STL file has been the industry standard for providing the CAD input to RP machines. It approximates the CAD model of a part using many planar triangular patches and has drawbacks. A novel procedure that overcomes these problems and integrates RE with RP is proposed. Algorithms that drastically reduce the point clouds data have been developed. These methods will facilitate the use of reverse engineered geometric data for rapid prototyping, and thereby will contribute in reducing the product development time.

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Michal Fabian [9]: The presented article deals with the application of Reverse Engineering and Rapid Prototyping processes in the development process in the automotive industry. In our case, we will focus on the design of the exterior rear view mirror. We obtained the information about the shape and as well as the data used to model the part in a virtual CAD computer environment by scanning it with a Leica laser scanner. The obtained point cloud was imported into CATIA V5 software, which is often used in the automotive industry. In the CATIA software modules, section curves were translated into cloud points. Based on these curves, free shaped surfaces of the mirror body and its holder on the car door were created. After creating the mirror body-mirror mount assembly, print data of these parts were generated for production by Rapid Prototyping technology. The printing method based on ABS material using the FDM (Fused Deposition Modeling) method was chosen.

Tai-Shen Huang [10]: Product development process can be time-consuming and difficult to manage. However, the time taken to complete the design portion of the process can be reduced by using reverse engineering and rapid prototyping techniques. This paper describes a novel design process for the development of objects made of soft material, and a diving glass has been presented as an example during the design process. In order to reconstruct the CAD model of objects of complex geometry, a laser scanner and reverse software was used to retrieve the form information of the objects. Since the communication between designer and client is very important, the use of remote access software can provide instantaneous interaction and feedback on designs. This method makes it possible to view and fully-interact with one computer from any other computer or mobile device anywhere on the Internet. For ultimate simplicity, there is even a Java viewer, so that any desktop can be controlled remotely from within a browser without having to install software. In this product development process, rapid prototyping allowed for physical models of a design of any shape and geometry to be created quickly. It also provided an opportunity to test different features and then change the design to create a more complete model. Finally, the result of design can be display on the screen by using virtual reality technology.

Irzmańska and Okrasa [11]: stated that 3D scanning is used to obtain the human body information in 3D digital form. This technology precisely measures the internal dimensions of footwear. It is the best method for the fitting of footwear, which increases the ergonomic properties.

Tredinnick et al [12]: discussed the importance of 3D scanning to solve a crime and used technology to document the crime scene for the complete investigation process. The scanned 3D model is precisely used to analyze the crime scene.

Lazarević et al [13]: presented that 3D scanning is a useful technique used to inspect part during the cutting process. This technology used for precise measurement as compared to coordinate measuring machine (CMM). The results show that the 3D scanning process increases the accuracy of inspection.

Haleem and Javaid [14]: studied that 3D scanning is successfully used in the medical field to captured information on the outer body surface. The research on this technology is continuously increasing. It is used for design and develops patient-specific implants. It accurately measures the skin area of the individual patient in 3D form. By using this technology, doctors can improve the treatment process.

Maloney [15]: shows the capability of 3D scanning to measure the stone defect surface area and is used for the proper estimation of flake mass.

Feng et al [16]: present that 3D scanning is a novel method to obtain initial geometric imperfections. This technology presents the object in point cloud data. The experiment was conducted, and we identified a reduction of geometric imperfections during the self-balanced process.

Andrews et al [17]: proposed that 3D scanning is a non-touch measuring technique that is feasible and increases performance. This technology can be used to see the growth 14 of preterm infants.

Javaid et al [18]: presented that 3D scanning is quite efficient in dentistry, and its applications are to create innovation in dental implants, tools, and devices. It is helpful for the design and development of dentures, braces, veneers, and aligners. It provides a better understanding of the teaching and learning process.

Chen et al [19]: identified that laser 3D scanning is useful for identifying and analyzing underground spaces. They presented a semi-automatic laser scanning method for rock mass characterization.

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Zhang et al [20]: used 3D scanning as an innovative method for road-marking detection and provided elevation accuracy of 0.25 mm and used this technology to precisely detect elevation information.
William T. McCann [21]: McCann wrote a book titled "The Design and Tuning of Competition Engines," which covers various aspects of engine design, including carburetor selection, sizing, and tuning for optimal performance.
David Vizard [22]: is an automotive author known for his expertise in engine performance tuning. His book "Tuning the A-Series Engine" discusses carburetor selection and tuning techniques specifically for A-Series engines.
Larry Shepard [23]: Shepard is the author of "How to Rebuild and Modify Carter/Edelbrock Carburetors," a comprehensive guide to rebuilding, modifying, and tuning Carter and Edelbrock carburetors commonly found in American muscle cars.
Bill Fisher [24]: Fisher authored "How to Tune and Modify Automotive Engine Management Systems," which covers a broad range of engine management topics, including carburetors, fuel injection systems, and electronic control units (ECUs).
David Emanuel [25]: Emanuel's book, "Weber Carburetors," provides detailed information on Weber carburetors, their theory, operation, and tuning.

CONCLUSION

In conclusion, this review paper highlights the advantages of utilizing RE for two-wheeler sprocket hub design and development. RE offers a comprehensive approach to analyse existing designs, extract critical information, and create digital models. Furthermore, the paper emphasizes the synergistic effect of combining RE with RP to expedite the development process. By leveraging these techniques, manufacturers can design and produce optimized sprocket hubs that meet specific performance requirements. Future research directions include exploring advanced RE techniques, such as laser scanning and photogrammetry, to capture intricate details of sprocket hub designs. Additionally, investigating the integration of RE with computer-aided design (CAD) software can further streamline the design and development process.

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